AMENDMENTS TO THE ABSTRACT

Please insert the Abstract of the Disclosure which is on the attached sheet.

AMENDMENTS TO THE SPECIFICATION

Page 1, after the title insert the following:

Background and Summary Of Invention:

This application is the US national phase of international application PCT/FI2004/000373 filed 17 June 2004 which designated the U.S. and claims benefit of FI 20030984, dated 30 June 2003, the entire content of which is hereby incorporated by reference.

Please amend the paragraph beginning at page 1, line 33 to page 2, line 2:

~~An object of the present invention is~~ A method has been developed to reduce the amount of fresh water or other clean washing liquid required for the washing of pulp in connection with bleaching. Specifically, ~~the object is~~is the method is believed to improve and intensify the washing between bleaching stages so that essentially the same purity of the pulp is reached with reduced amount of fresh water compared to prior art washing processes.

Please amend the paragraph beginning at page 2, line 4:

~~The present invention relates to a~~A method of treating pulp in connection with the bleaching of chemical pulp has been developed, which method comprises treating the pulp in at least an ozone, chlorine dioxide or alkali stage and washing the pulp thereafter in a washing device having an E_{10} –value of at least 3, preferably more than 4, whereby washing liquid is introduced in the washing device countercurrently in relation to the pulp and filtrate is removed from the washing device. ~~A characteristic feature of the invention is that t~~The pulp is washed in the washing device so that the first washing liquid is filtrate obtained from the washing device itself and the amount of said washing liquid is 1.5-3.5 t/adt, whereafter the pulp is washed with a washing liquid introduced into the washing device from outside the device, the amount of said washing liquid being such that the dilution factor in the latter washing is lower than 1 t/adt and

the total amount of washing liquid used in the washing device is such that the resulting dilution factor is over 0 t/adt.

Please amend the paragraph beginning at page 2, line 31 to page 3, line 2:

Thus, the washing stage ~~according to the invention~~ relates to a single-stage countercurrent wash carried out between the bleaching stages, in which wash the dilution factor is less than 1 t/adt and part of the filtrate from that stage is taken to the beginning of said stage to be used as washing liquid. This treating of pulp with an internally circulated filtrate may be considered as a kind of preliminary washing.

Please amend the paragraph beginning at page 3, line 4:

Especially the invention ~~relates~~ may be applied to the washing of pulp after an ozone stage, chlorine dioxide stage and/or alkali stage. Alkali stages include e.g. E-, EO-, EP-, EOP-, P-, PO- or OP stages. Chlorine dioxide stages include e.g. (DC), C/D, D/C, D_0, D_1, D_2 and D_3 stages, with possible addition of chemicals, such as chlorine, EDTA or NaOH.

At page 3, after line 31, insert the following:

Summary of Drawings:

A page 4, after line 6, insert the following:

Detailed Description of Invention:

Please amend the paragraph beginning at page 4, line 8:

Fig. 1 shows a washing device 45 for displacement washing. Such washing devices include e.g. diffusers and some filters as well as some DD-washers. Pulp 41 is washed by displacement with washing liquid 44. ~~In accordance with the invention,~~

~~p~~Part of the washing liquid 44 is replaced with filtrate 47 from the very same stage, with which filtrate the pulp is first washed, and which originates from a later washing of the pulp in the washing device with washing liquid 44 introduced from outside the washing device. Internal circulation of filtrate significantly reduces the amount of washing liquid 44 coming from outside the washing device.

Please amend the paragraph beginning at page 4, line 28:

~~According to the present invention, p~~Part of the washing liquid 54 coming from outside the washing device is replaced with filtrate of the washing stage itself. The internal filtrate of the stage is formed in a displacement part (55) and/or pressing/thickening part (56). The pulp 51 introduced to the washing device is first washed with this filtrate. This significantly decreases the amount of washing liquid 54 introduced from outside.

Please amend the paragraph beginning at page 4, line 34 through page 5, line 8:

~~In accordance with the invention, t~~The pulp is first washed with the internal filtrate of the washing device and then with washing liquid introduced from outside the washing device, the amount of which liquid is such that the dilution factor in the latter wash is less than 1, preferably less than 0, most preferably less than –1. The dilution factor, also known as washing water surplus, is the washing liquid flow (44, 54) minus the amount of liquid entrained in the exiting pulp flow (43, 53) where the unit is t/adt. Example: The incoming liquid flow (44) is 7 t/adt. The consistency of the exiting pulp flow is 10%, i.e. the exiting flow (43) is 1 bdt of pulp and 9 t of liquid/bdt or 0.9 t of adt pulp and 8.1 t of liquid/adt. (bdt=bound dry ton pulp, i.e. 100 % pulp, adt = air dry ton pulp, i.e. 90 % pulp, i.e. 900 kg pulp). Thus, the dilution factor is 7 – 8.1 = -1.1 when the unit is t/adt.

Please amend the paragraph beginning at page 5, line 10:

~~According to the invention, t~~The combined washing liquid amount required for the washing device (in conduit 44 and 47 of Fig. 1; conduits 54, 57 and 58 of Fig. 2) is such that the dilution factor is more than 0 t/adt, preferably more than 1.0 t/adt, typically 0-6 t/adt, most typically 1-4 t/adt. ~~In accordance with t~~The invention, the washer uses filtrate (47) from its own bleaching stage, e.g. 2.5 t/adt and thus we end up with a dilution factor for the whole washing operation (47, 44) of –1.1+2.5=1.4 t/adt. Normal dilution factors for bleaching are in the range of 1-3. That is, the method ~~according to the invention~~ achieves the same dilution factor level as is normal in a displacement operation, while the amount of liquid introduced from outside is much smaller than normally expressed as dilution factor (-1.1 t/adt). In bleaching technology, this provides for an excellent chance to decrease the use of fresh water by 1.5-3.5 ton/washer/ton of pulp. A bleaching plant usually has 3-5 bleaching stages. When the method ~~according to the invention~~ is applied e.g. to two stages, the obtained saving in water is 3-7 tons per ton of pulp, which is very significant considering that typically the total water consumption in a bleaching plant is 10-20 t/adt.

Please amend the paragraph beginning at page 5, line 26:

Balance calculations have shown that reusing water ~~according to the invention~~ inside one and the same bleaching stage in practice leads to the same washing result as when using only externally-introduced washing liquid, as long as the total dilution factor is the same and the efficiency of the washing device is high enough to ensure an adequate purity of the circulated filtrate fraction. This is a surprising result, as the art has always taught that without an adequate amount of water introduced from outside it is not possible to reach a satisfactory washing result between bleaching stages. This newly invented method of washing will, however, remarkably decrease the water consumption of bleaching plants without significant additional investments.

Please amend the paragraph beginning at page 6, line 23:

~~The novel idea of the present invention~~ A feature of recirculating wash liquid filtrate is that in bleaching the use of water, especially fresh water, coming from outside a stage ~~in question~~, may be decreased~~, i.e.~~ in a way the washing is completed under a shortage of washing water. ~~This would result in a p~~Poor washing may result between bleaching stages, if the internal circulation inside a washing stage would not be practiced.

Please amend the paragraph beginning at page 6, line 23:

The method ~~according to the invention~~ is especially suitable for bleaching, where washing between two bleaching stages is accomplished by displacement washing and the pH-values and other conditions of the bleaching stages are different from each other, whereby vast differences between filtrate fractions in view of pH, temperature or some other property are obtained. That is, the filtrate to be circulated differs essentially from the rest of the filtrate in view of concentration, pH or temperature. We may say that the properties of the filtrate to be circulated must resemble the properties of externally introduced washing water more than the properties of the filtrate being discharged from the washing device. This may also be described so that if a property of externally introduced washing water is C0 and the corresponding property entering with the pulp is C1, the difference in properties is C1-C0. The property of the filtrate to be circulated Ccirculation=C0 + kx(C1-C0), where k is less than 0.35, preferably 0.2. Here C may be a chemical content or a corresponding property.

Please amend the paragraph beginning at page 7, line 1:

The method ~~according to the invention~~ is especially suitable for bleaching, where washing between two bleaching stages is accomplished by displacement washing and the pH-values and other conditions of the bleaching stages are different from each other, whereby vast differences between filtrate fractions in view of pH, temperature or some other property are obtained. That is, the filtrate to be circulated differs essentially

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